



Docket No. 24180 044008

Application No. 09/369,978

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Galloway, et., U.S. Patent Application )  
No. 09/369,978 for "Multi-Layer )  
**Thermoplastic Films and Packages Made** )  
**Therefrom"** )  
Filed: July 30, 1999 )  
Examiner: R. Dye )  
Group Art Unit: 1772 )

**DECLARATION OF KEITH LIND**

1. I am a Senior Research Associate at the Pechiney Technical Center in Neenah, Wisconsin.
2. I obtained a BS at the University of Minnesota in 1960 and a MS & PhD degree at Kansas State University in 1969. I have a total of 26 years experience in the area of plastic materials and application development with Pechiney Plastic Packaging
3. I am an inventor or co-inventor on 8 issued U.S. Patents.
4. I am one of the named co-inventors for U.S. Patent Application No. 09/369.978, filed July 30, 1999.

5. I am informed that the United States Patent and Trademark Office has rejected claims 22-27 of the above-identified application under 35 U.S.C. 103(a) as being unpatentable over Newsome (4,457,960) in view of Lai et. al (5,272,2236).

6. I am informed more specifically, that the U.S. Patent and Trademark Office has stated with regard to the above-identified rejection the following.

Newsome teaches linear low density polyethylene (LLDPE) used in multiple layer molecularly oriented films (Abstract). The film includes a first barrier layer having two opposing surfaces wherein first and/or second pairs of layers are adhered. In preferred structures the first pair of layers comprises 70% to 100% EVA and the second pair of layers comprises 10% to 90% LLDPE. The second and third layers, or barrier layer, may comprise an ethylene vinyl acetate (EVA), and the fourth layer comprises 10% to 100% LLDPE (column 2, line 40 to column 3, line 24). Newsome uses conventional LLDPE, wherein one commercially available material is DOWLEX (column 5, lines 45+). The barrier layer may be ethylene vinyl alcohol copolymer (column 3, lines 25-28). A substantial end use of the film is in heat sealable shrink bags for utilization particularly in packaging (column 3, lines 32-37). The thickness of each layer of the film is essentially the same as the same layer in conventional shrink films. By way of example in a typical film used to make the bag of figures 1 and 2, the overall film thickness is 2.25 mils. Layers 14 and 18 are 0.4 mil, and layer 16 is 1.45 mils (column 4, lines 60-65).

Newsome does not teach using metallocene catalyzed polyethylenes, or polymers or copolymers formed by a polymerization reaction with a single site catalyst.

Lai et al. teaches a substantially linear polyethylene that has superior properties to conventional polyethylenes, wherein comparisons are made between their invention and DOWLEX 2054, a conventional LLDPE (see Examples 7-9). They also teach that the polymers of their invention are superior to conventional polyethylene polymers in terms of gloss, haze, dart impact and clarity (see Examples 10-13).

Lai et al. further teaches a molecular weight distribution of less than 2.5 (column 22, lines 55-65). Example 6 of Table II (column 18, lines 48-66; column 19) discloses comparative data which includes examples 5-6 having a  $I_{10}/I_2$  values of 9.45 and 7.61, respectively, and a molecular weight distribution of 1.97 and 2.09, respectively. Comparative Examples 7 refers to that of Dowlex 2045 (that of the Newsome reference) which has a molecular weight distribution of 3.5-3.8. Therefore, the Lai reference clearly teaches an improvement over the Dowlex 2045 resin.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used substantially linear olefin polymers of the type taught by Lai et al. in place of the DOWLEX used in the films taught by Newsome, in order to have produced a film having higher gloss, lower haze, and better clarity.

Although Newsome fails to expressly teach irradiation of the film, it is conventional to cross-link films in order to improve the abrasion resistance of the film. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have irradiated the film taught by Newsome in order to have cross-linked the layers and to have improved the abrasion resistance.

7. It is my opinion that the film structure, as described in claims 22-27, of the present invention is patentably distinct and therefore non-obvious from the film structure disclosed in Newsome in view of Lai.

The present invention, as described in claims 22-27, teaches a heat shrink film comprising:

- (a) a first barrier layer, said first barrier layer having two opposing surfaces; and
- (b) second and third layers, said first barrier layer being disposed between said second and third layers, said second and third layers comprising blends of from about 1% to about 99% of an ethylene alpha-olefin copolymer formed by a polymerization reaction in the presence of a single site catalyst, said ethylene alpha-olefin copolymer having a molecular weight distribution of less than 2.5 and a  $I_{10}/I_2$  ratio of about 7 to 12; and from about 99% to about 1% ethylene vinyl acetate copolymer; wherein said film is irradiated.

Newsome discloses linear low density polyethylenes, which are chemically and physically distinct from the linear low density polyethylenes taught in Applicants' claims. In fact, the linear low density polyethylene described and taught in Newsome are produced by a process which produces polyethylenes, which are vastly different from the polyethylenes produced by the single site catalyst technology. The polyethylenes of Newsome have a wide molecular weight range and therefore wide melting point ranges. The polyethylenes produced by single site technology are extremely uniform in composition and molecular weight. Therefore, melting point ranges are quite narrow. Furthermore, Newsome does not teach or suggest that any other linear low density polyethylenes could be used, let alone the linear low density polyethylenes of Applicants' claims.

Therefore, these differences produce an LLDPE that would react differently in a given film environment than the LLDPE taught by Newsome.

Lai discloses a class of linear olefin polymers having certain characteristics and improvements over conventional LLDPE such as the LLDPE taught by Newsome.

Lai further discloses a process of manufacturing said linear olefin polymers. Lai also discloses that these polymers are useful in a variety of areas such as fibers, films and molded parts. There is, however, no teaching or suggestion whatsoever by Lai of a specific multi-layer type of film structure (i.e., barrier films, non-barrier films, blended, non-blended films) or how these

polymers would react or even how they could be useful within the context of any specific film structures. In addition, there is certainly no teaching in Lai or Newsome to combine the teachings to make Applicants' claimed films.

The design of a specific and viable film structure such as disclosed in claims 22-27 of the present invention involves the consideration of many factors. These factors can be exemplified by heat sealability, barrier properties, high strength (i.e., tensile, impact and tear); color differential, surface frictional properties, adhesive between layers, stiffness/modulus of elasticity, optical quality/clarity and gloss. Since it is the combination of these factors that produced a viable film structure the polymers or resins which are selected to comprise the film structure must be selected with these factors in mind. The polymer or resin which comprises a specific layer of the total film structure fulfills a specific purpose or need (i.e., adhesive, clarity, gloss). The individual polymer or resin, however, while fulfilling a specific purpose must also be compatible with the other polymers or resins which comprise the total film structure. The individual polymer or resin must also not reduce the positive purpose supplied by the other polymers or resins which comprise the total film structure. Therefore the design of a viable specific film structure involves at least three critical factors: 1) polymer or resin fulfills a specific purpose, 2) polymer or resin must be compatible with the other polymers or resins which comprise the film structure, and 3) the polymer or resin does not diminish the positive purpose of the other polymers or resins which are part of the total film structure.

A knowledge that a specific resin possess certain properties does not, therefore, address the total issue. Since the selected resin must also be compatible with the other resins which comprise the total film structure and the selected resin must also not reduce the positive effects supplied by the other resins of the film structure, the usefulness of a given resin in a total film structure is addressed through experimentation. It is through experimentation that one balances the three factors to arrive at a viable film structure.

Lai contains no enabling disclosure that either teaches or suggests to those skilled in the art how any of these factors would be addressed with the use of Lai's polymer within the context of any specific multi-layer film, structure, or class of film structure, let alone Applicants' specific film structure.

A disclosure of a monolayer film structure comprising solely the polymer of Lai does not address the factors discussed above. Because these factors change with the introduction of another resin (i.e., ethylene vinyl acetate copolymer) or with the introduction of a barrier layer (ethylene vinyl alcohol copolymer) in a film structure, there is no way of predicting whether the film structure having more than one component will be viable based on the knowledge derived from the Lai disclosure.

Polymers and copolymers made by polymerization with single site or metallocene catalysts are often known as homogeneous polymers because they have very homogeneous structures and narrow molecular weight distributions. On the other hand, polymers such as linear low density polyethylene (LLDPE)

made with Ziegler-Natta (ZN) catalysts have non-uniform or heterogeneous structures and broader molecular weight distributions. This causes significant differences between the thermal, physical and processing properties of the two types of materials.

For example, homogeneous polymers made with single site catalysts (SSC) have lower melting points and are stronger and tougher than comparable polymers made with ZN catalysts. This makes the SSC materials ideally suited for use in film applications requiring high strength and strong heat seals. However, the homogeneous nature and the narrow molecular weight distribution of the SSC materials makes them more difficult to process by melt extrusion during multilayer film manufacturing and film orientation by the double bubble process.

In pursuing this invention the inventors had to determine by experimentation that the materials with a molecular weight distribution ( $M_w/M_n$ ) of about 2.5 were processable for the current intended use. It was determined that materials with the claimed  $I_{10}/I_2$  ratio could be successfully extruded and formed into the claimed film structure.

During the double bubble orientation process, SSC materials with narrow molecular weight distributions are difficult to draw down to obtain the desired level of orientation and free shrink. The material can fracture and the bubble will break to stop the process during orientation. Again, the inventors were required to determine by experimentation that the claimed film structures made



with the claimed materials were, in fact orientable in the double bubble process employed to manufacture the film.

8. Therefore it is my opinion that that the design of a viable film structure involves the consideration of many factors as indicated above. Without experimentation, there would be no way of predicting how any of the various factors, either singularly or in combination, could be affected by a change in a component of the film structure (i.e., substituting one LLDPE for another LLDPE). Therefore, given the chemical and physical differences between the LLDPE in Newsome and the LLDPE of Applicants' film structure, the lack of teaching or suggestion in Lai as to how its polymer would affect the various considerations discussed earlier for specific film structures or even in a class of specific film structures (i.e., barrier films, blended films, etc.) and the unpredictability as to the effect of altering the components of a specific film structure, it is not seen how these references either singularly or in combination can render obvious claims 22-27.

9. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

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Keith Lind